

527/54
Rec'd PCT/PTO 09 MAR 2005
1527.54
(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
25 March 2004 (25.03.2004)

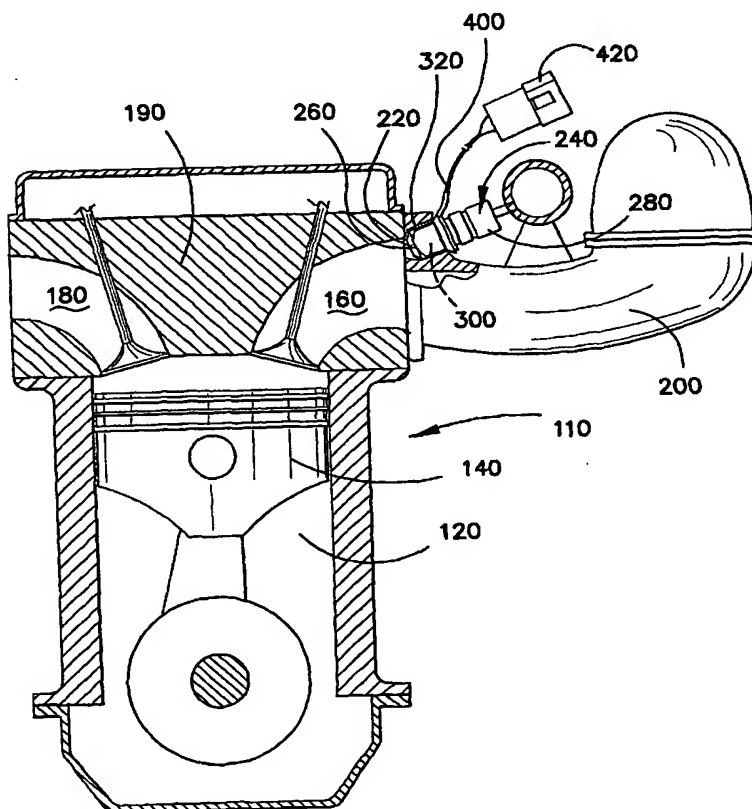
PCT

(10) International Publication Number
WO 2004/025112 A1

- (51) International Patent Classification⁷: **F02M 53/06**, 31/125
- (21) International Application Number: **PCT/AU2003/001156**
- (22) International Filing Date: **5 September 2003 (05.09.2003)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
2002951332 11 September 2002 (11.09.2002) AU
2003904065 1 August 2003 (01.08.2003) AU
- (71) Applicant (for all designated States except US): **VAPORATE PTY LTD [AU/AU]**; Level 10, 257 Collins Street, Melbourne, Victoria 3000 (AU).
- (72) Inventor; and
(75) Inventor/Applicant (for US only): **RIGNEY, Shaun, Thomas [AU/AU]**; 9 Currajong Street, Doncaster East, Victoria 3109 (AU).
- (74) Agent: **GRIFFITH HACK**; 509 St Kilda Road, Melbourne, Victoria 3004 (AU).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: **FUEL DELIVERY SYSTEM**



(57) Abstract: A fuel delivery system for an IC engine includes an injector (240) which is heated as its region to elevate the temperature of the fuel in the end region and so that when the fuel is ejected from the end region, it immediately converts to vapour. Heating of the end region is performed either by direct conduction from the engine or by an electrical heating element. A gasket (22) of heat conducting material is provided between the cylinder head and the inlet manifold (200) so heat is conducted to the inlet manifold (200) and then to injector (240). An electrical heating element (320, 380) is provided surrounding the end region of the injector so that it can heat up the end region immediately without having to wait for the engine to reach operating temperature.

WO 2004/025112 A1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU03/01156

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: F02M 53/06, 31/125

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Refer electronic database consulted below

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI - IPC as above; F02M and keywords inject, heat, tip, end, manifold and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Patent Abstracts of Japan, JP 2002-004974 A (DENSO CORP) 9 January 2002 Abstract	11-31
X	US 2001/0052553 A1 (HOKAO) 20 December 2001 Whole document	11-31
X	US 3868939 A (FRIESE et al) 4 March 1975 Whole document	11, 15, 32

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
30 October 2003

Date of mailing of the international search report 06 NOV 2003

Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

R. SUBBARAYAN

Telephone No : (02) 6283 2377

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU03/01156

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 99/05412 A1 (SIEMENS AUTOMOTIVE CORPORATION) 4 February 1999 Whole document and especially page 10, line 29 - page 11, line 5	11, 15, 32 1, 7-10
X	Derwent Abstract Accession No 87-176690/25, Class Q53 Q54, SU 1268785 A (NOVOS AGRIC INST) 7 November 1986 Abstract	11-31
X	Derwent Abstract Accession No 98-409951/35, Class X22, JP 10169526 A (NISSAN MOTOR CO LTD) 23 June 1998 Abstract	11-31
X	US 6332457 B1 (IMOEHL) 25 December 2001 Whole document	11, 15
X	EP 915248 A1 (RENAULT) 12 May 1999 Whole document	32
Y	WO 02/50425 A1 (INSTITUT FRANCAIS DU PETROLE) 27 June 2002 Page 8, line 7-9	1, 7-10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU03/01156

Box I Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos :
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos :
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos :
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box II Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1) Claims 1-10 are directed to a fuel delivery system wherein heat is conducted from the engine via a heat conducting gasket to the inlet manifold and then to the end region of a fuel injector. It is considered that the heat conducting gasket comprises a first special technical feature.

2) Claims 11-33 are directed to a fuel delivery system having electrical heating means for heating the end region of the injector. It is considered that the electrical heating means comprises a second special technical feature.

Since these groups of claims do not share any of the special technical features identified, a technical relationship between the inventions does not exist. Accordingly the claims do not relate to one invention or to a single inventive concept, a priori.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU03/01156

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
US	20010052553				
US	3868939	AT	185073	CH	553330
		ES	412149	FR	2174504
		JP	48100524	NL	7302974
		SU	544392	DE	2210250
				GB	1418981
				RO	65174
WO	9905412	EP	0890023	EP	0927300
		EP	1157204	JP	2002538369
		US	5758826	US	6102303
		US	6135360	US	2001040187
		WO	9737121	WO	9905411
US	6332457	EP	1155232	JP	2002538357
WO	0250425	AU	25090/02	EP	1346145
EP	0915248	FR	2770876	WO	0050763
				FR	2818699
END OF ANNEX					